FIG. 1
(PRIOR ART)

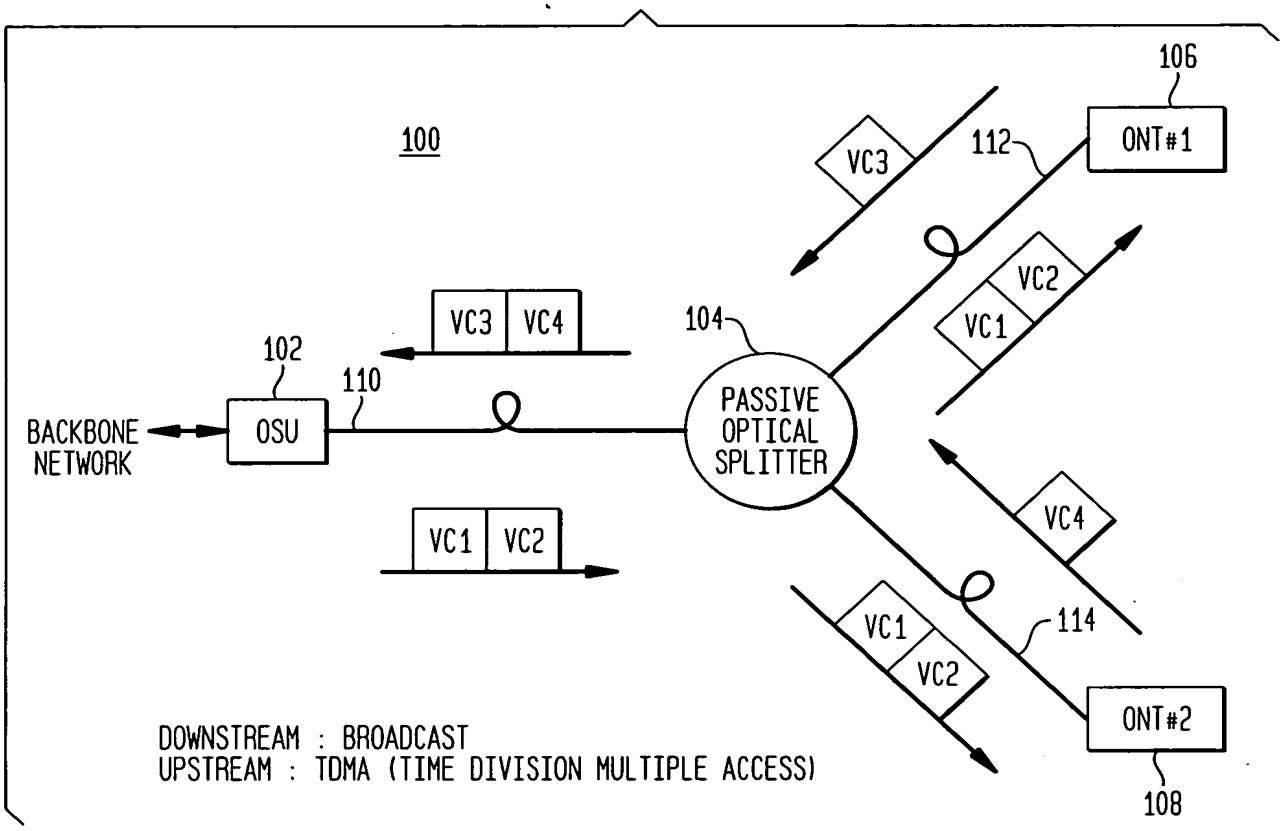


FIG. 2A
(PRIOR ART)

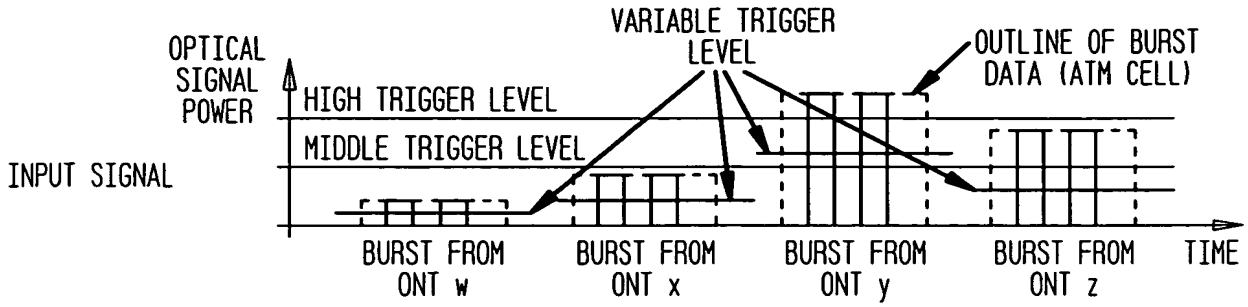


FIG. 2B
(PRIOR ART)

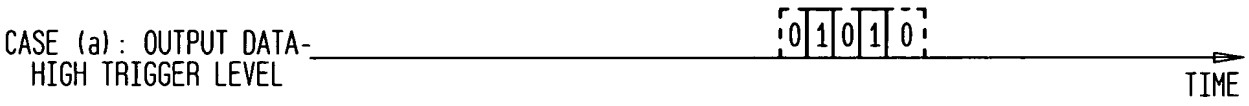


FIG. 2C
(PRIOR ART)

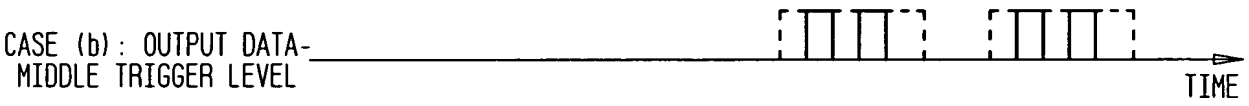


FIG. 2D
(PRIOR ART)

FIG. 3A

[1] DOWNSTREAM FRAME BOUNDARIES

FIG. 3B

[2] DOWNSTREAM RANGING PLOAM CELL

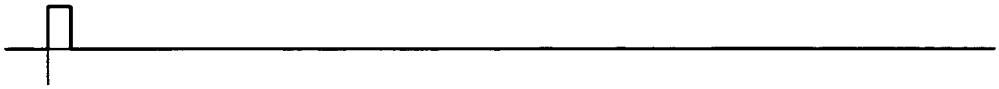


FIG. 3C

[3] UPSTREAM RANGING REPLY CELL (Td=0)

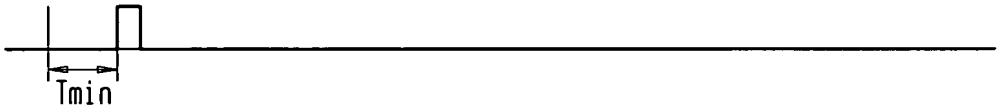


FIG. 3D

[4] UPSTREAM RANGING REPLY CELL (Td>0)

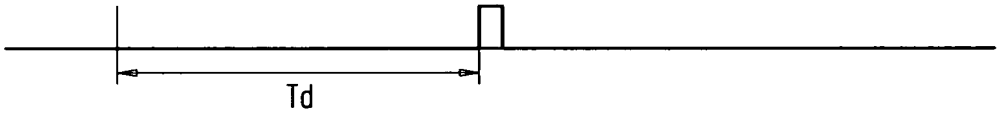


FIG. 3E

[5] UPSTREAM CELL AFTER RANGING

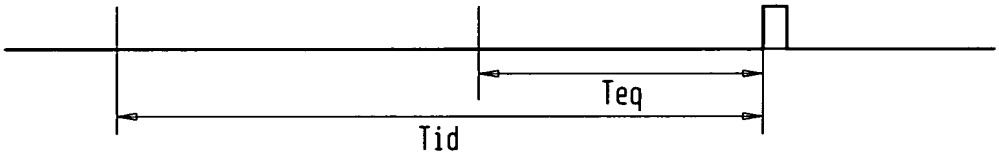


FIG. 3F

[6] DOWNSTREAM PLOAM CELL WITH GRANTS IN 1st,2nd,3rd TIME SLOT

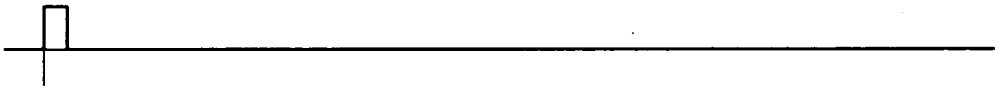


FIG. 3G

[7] 3 UPSTREAM CELL IN 1st,2nd,3rd TIME SLOTS AFTER RANGING

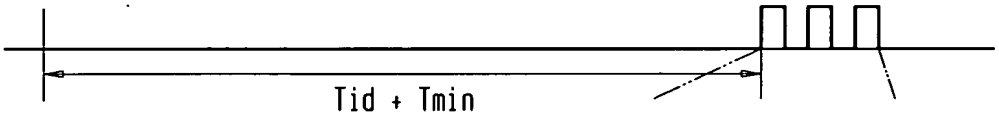


FIG. 3H

[8] EXPANSION OF 3 UPSTREAM CELLS SHOWING POSITION OF bmr RESET PULSE

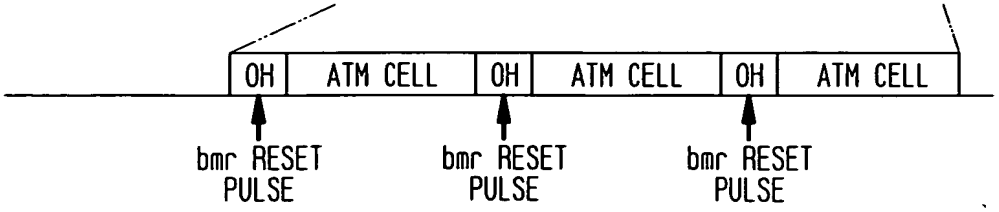
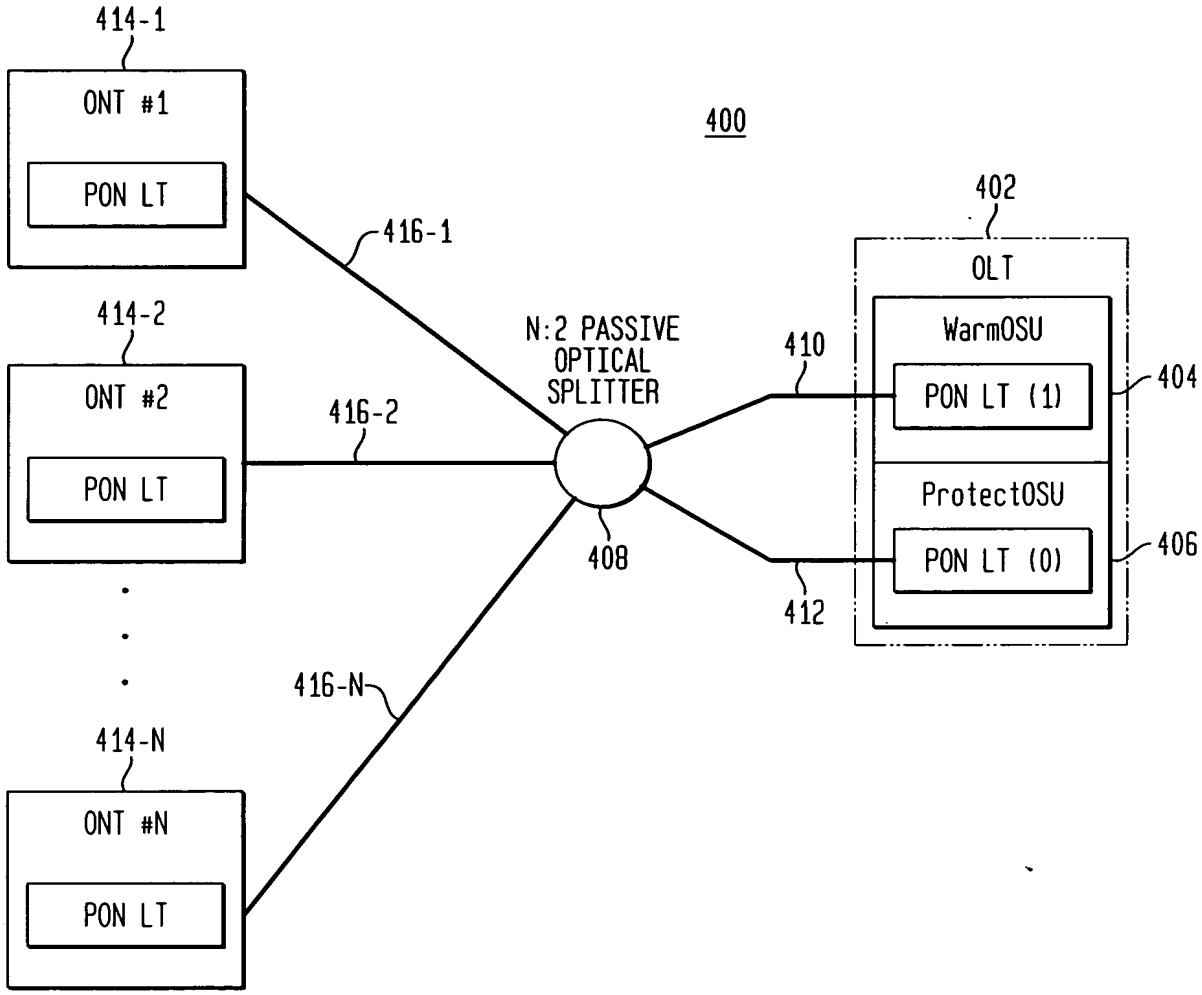
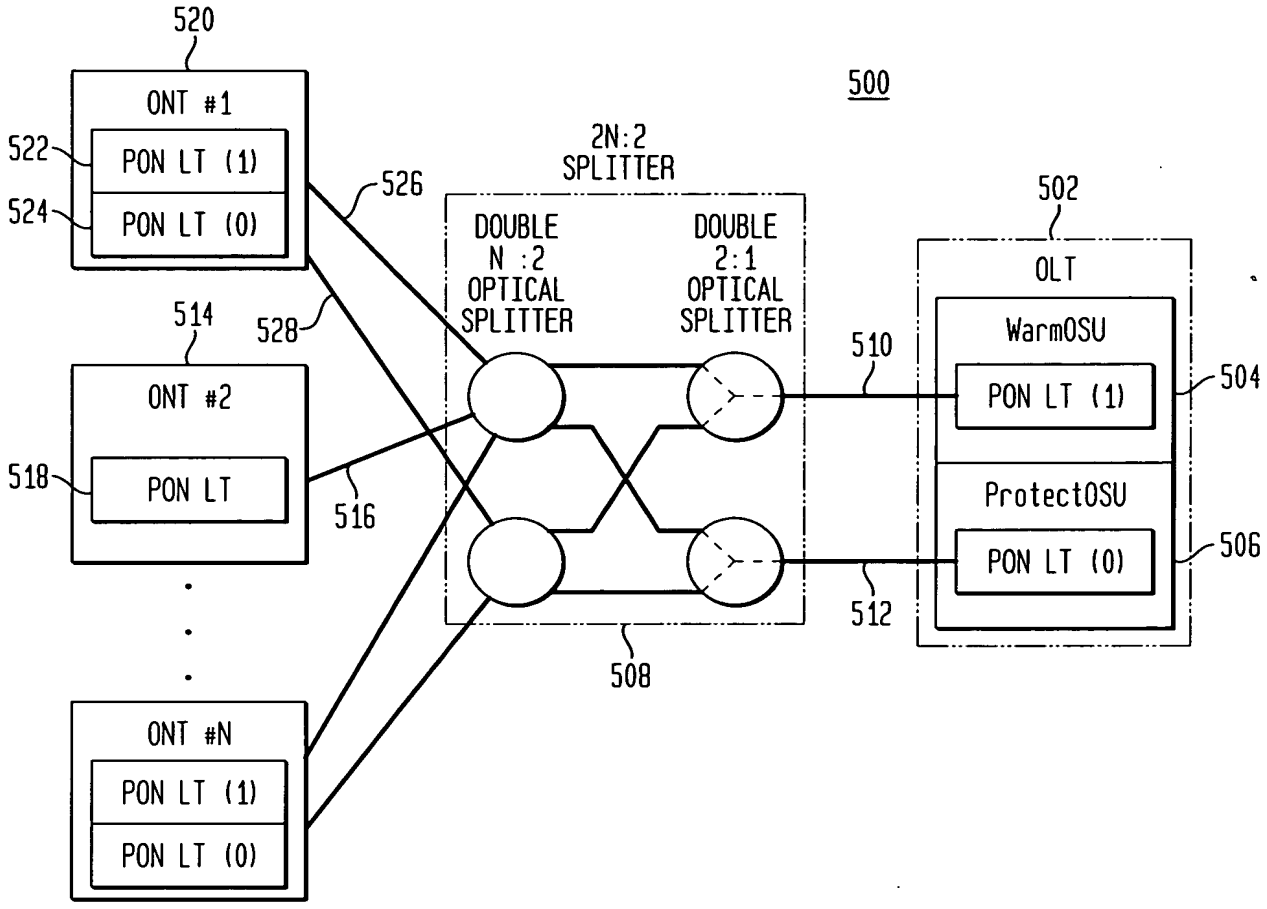


FIG. 4



OLT-ONLY DUPLEX SYSTEM

FIG. 5



PARTIAL DUPLEX SYSTEM

FIG. 6

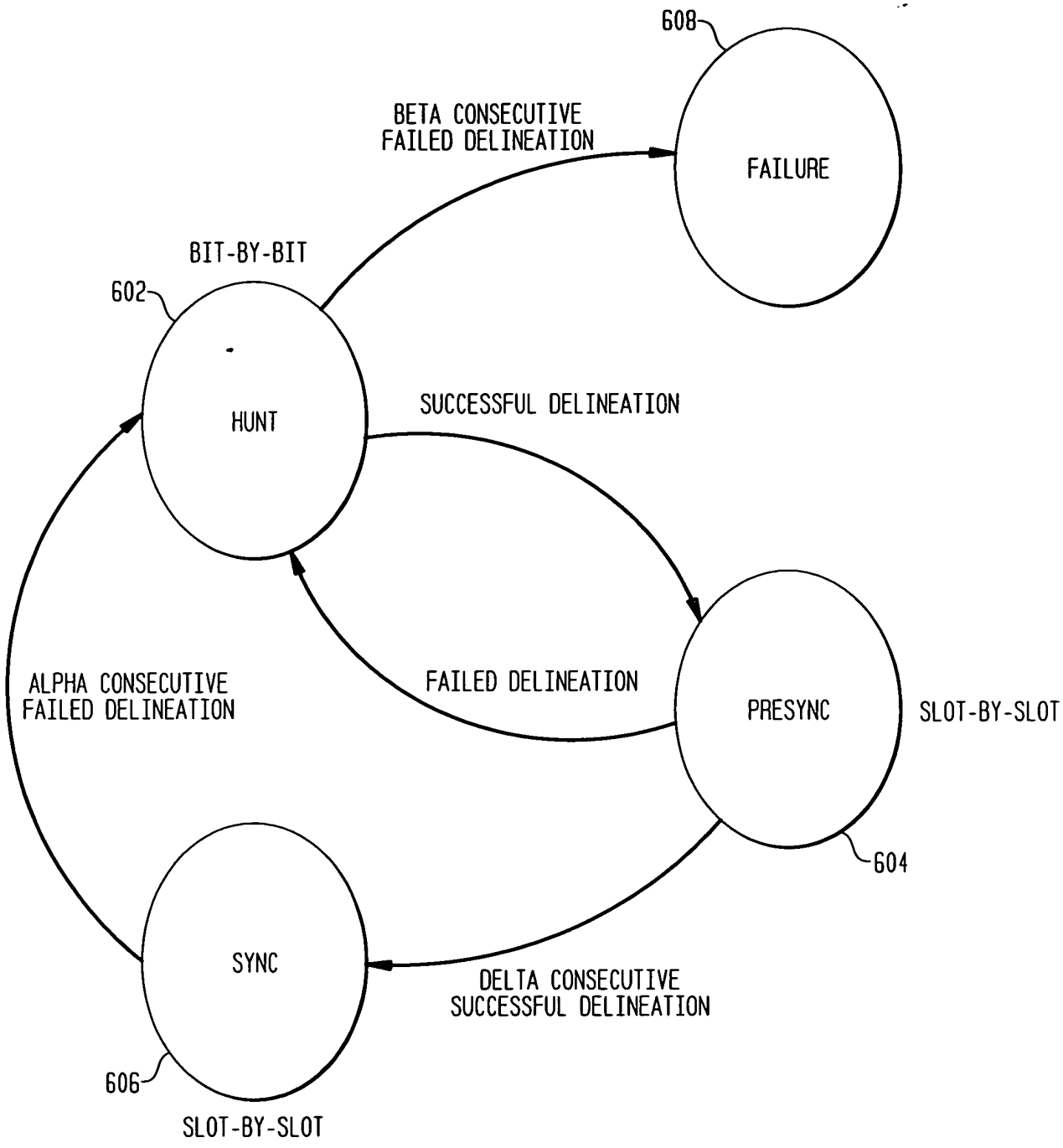


FIG. 7A

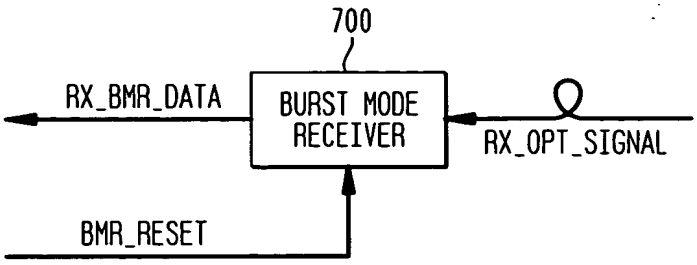


FIG. 7B

TIMING REFERENCE AT WarmOSU

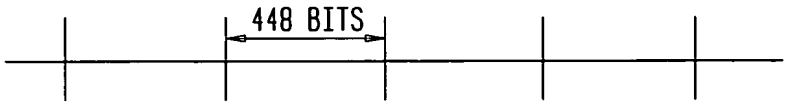


FIG. 7C

RX_OPT_SIGNAL (OPTICAL SIGNALS RECEIVED BY BURST MODE RECEIVER)

FIG. 7D

BMR_RESET (BURST MODE RECEIVER
RESET SIGNALS-SPACED OUT BY 449/448 BITS)

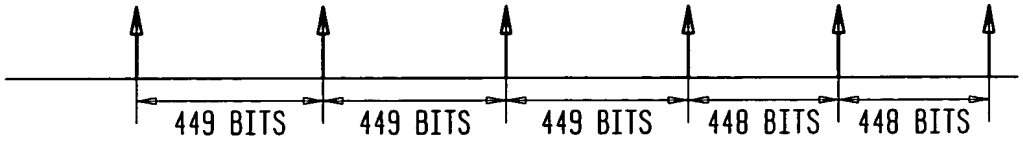


FIG. 7E

RX_BMR_DATA (OUTPUT OF BURST MODE RECEIVER)

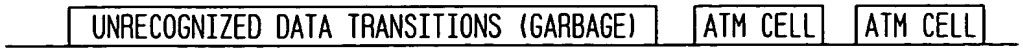


FIG. 8A

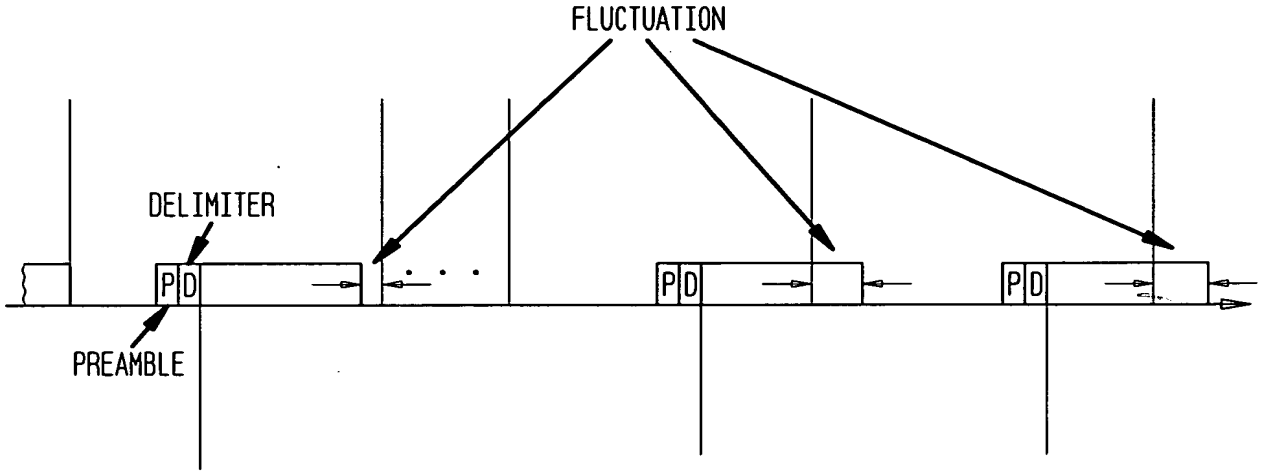

FLUCTUATION
DELIMITER
P
D
PREAMBLE

FIG. 8B

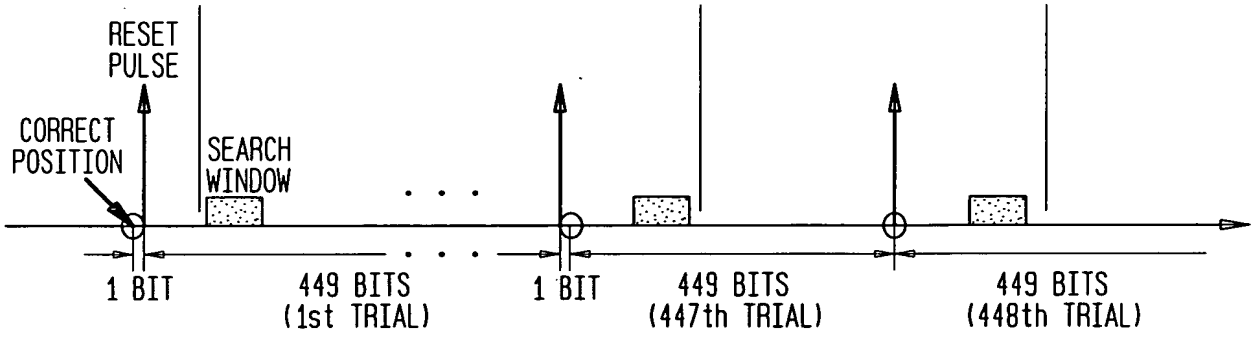

RESET PULSE
CORRECT POSITION
SEARCH WINDOW
1 BIT
449 BITS (1st TRIAL)
1 BIT
449 BITS (447th TRIAL)
449 BITS (448th TRIAL)

FIG. 9A

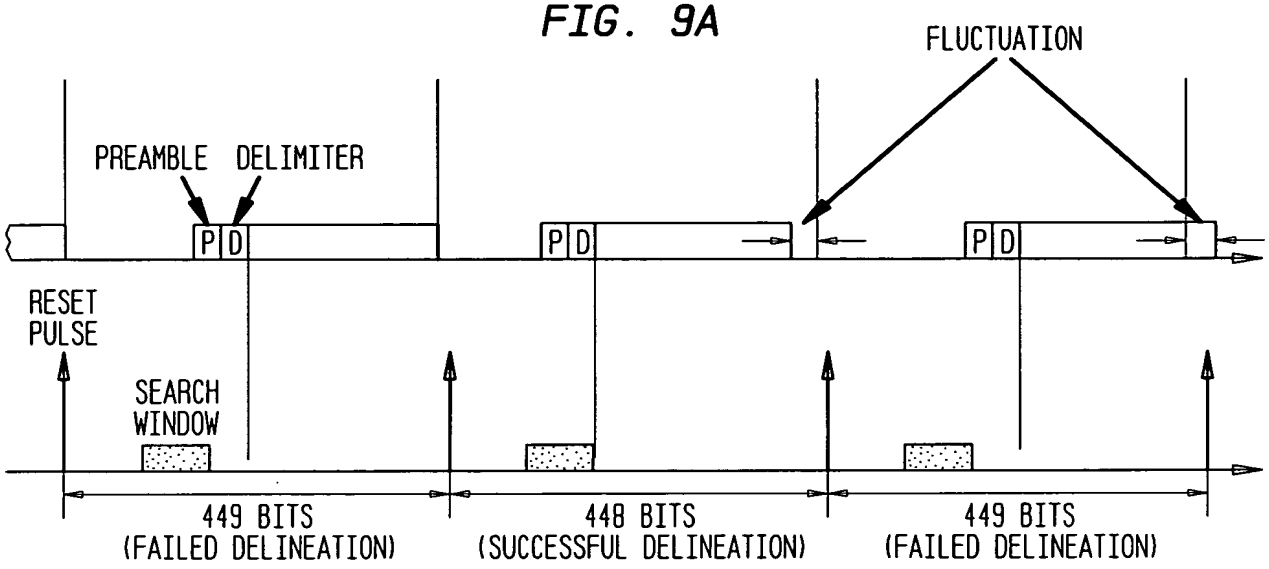

FLUCTUATION
PREAMBLE
DELIMITER
P
D
RESET PULSE
SEARCH WINDOW
449 BITS (FAILED DELINEATION)
448 BITS (SUCCESSFUL DELINEATION)
449 BITS (FAILED DELINEATION)

FIG. 9B

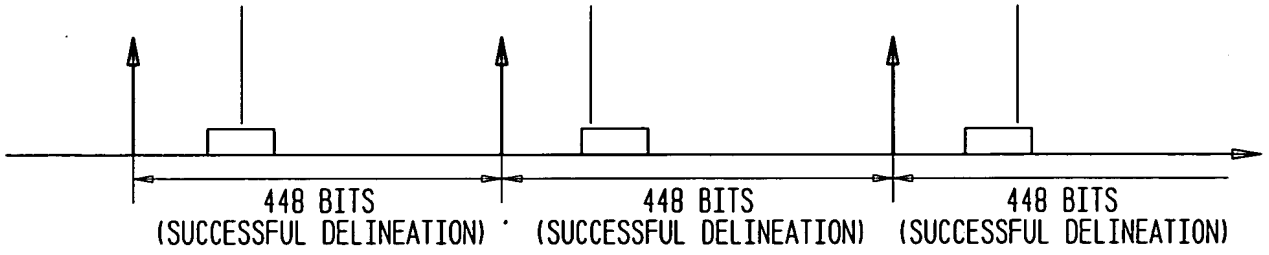

448 BITS (SUCCESSFUL DELINEATION)
448 BITS (SUCCESSFUL DELINEATION)
448 BITS (SUCCESSFUL DELINEATION)

FIG. 10A

FRAME BOUNDARIES ON WarmOSU AND ProtectOSU (SYNCHRONIZED)

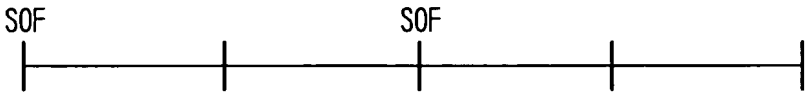


FIG. 10B

DOWNSTREAM PLOAM CELLS (PL1 CONTAINS PLOAM GRANT FOR ONT #1)

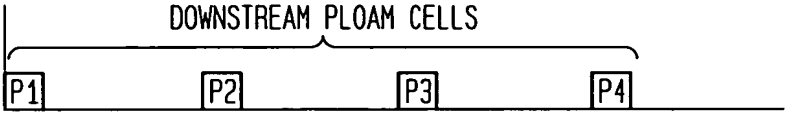


FIG. 10C

UPSTREAM RECEPTION OF PLOAM CELL FROM ONT #1 (Td1, Td2=0)

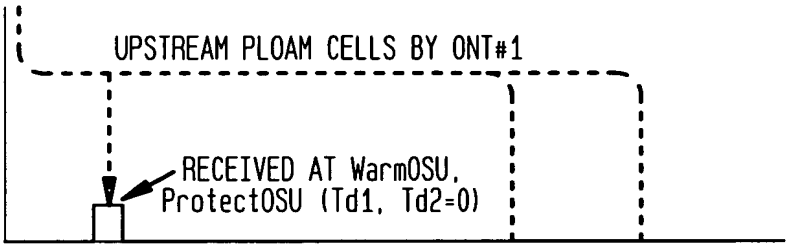


FIG. 10D

UPSTREAM RECEPTION OF PLOAM CELL FROM ONT #1 (Td1>0) AT WarmOSU

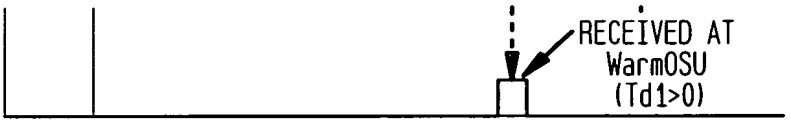
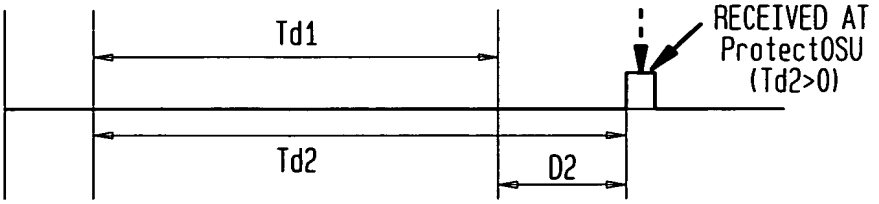


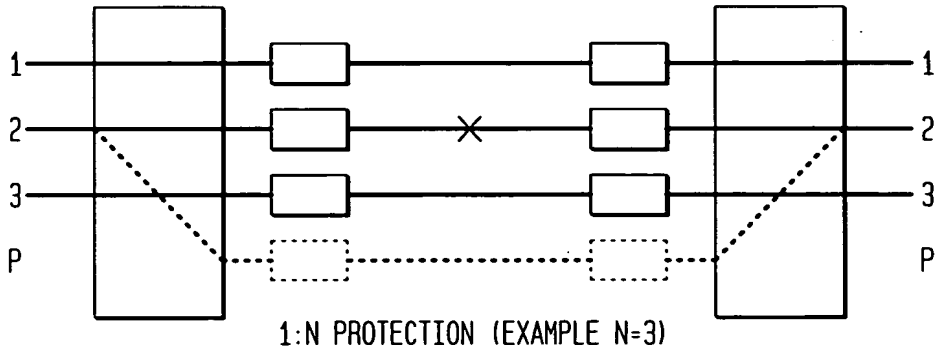
FIG. 10E

UPSTREAM RECEPTION OF PLOAM CELL FROM ONT #1 (Td2>0) AT ProtectOSU



Td1: DELAY MEASURED AT WarmOSU
Td2: DELAY MEASURED AT ProtectOSU
D2: TIME DIFFERENCE BETWEEN START OF FRAME IN WarmOSU AND ProtectSU, DUE TO DIFFERENCE IN DISTANCE TO SPLITTER
*SOF: START OF FRAME

FIG. 11



1:N PROTECTION (EXAMPLE N=3)

FIG. 12

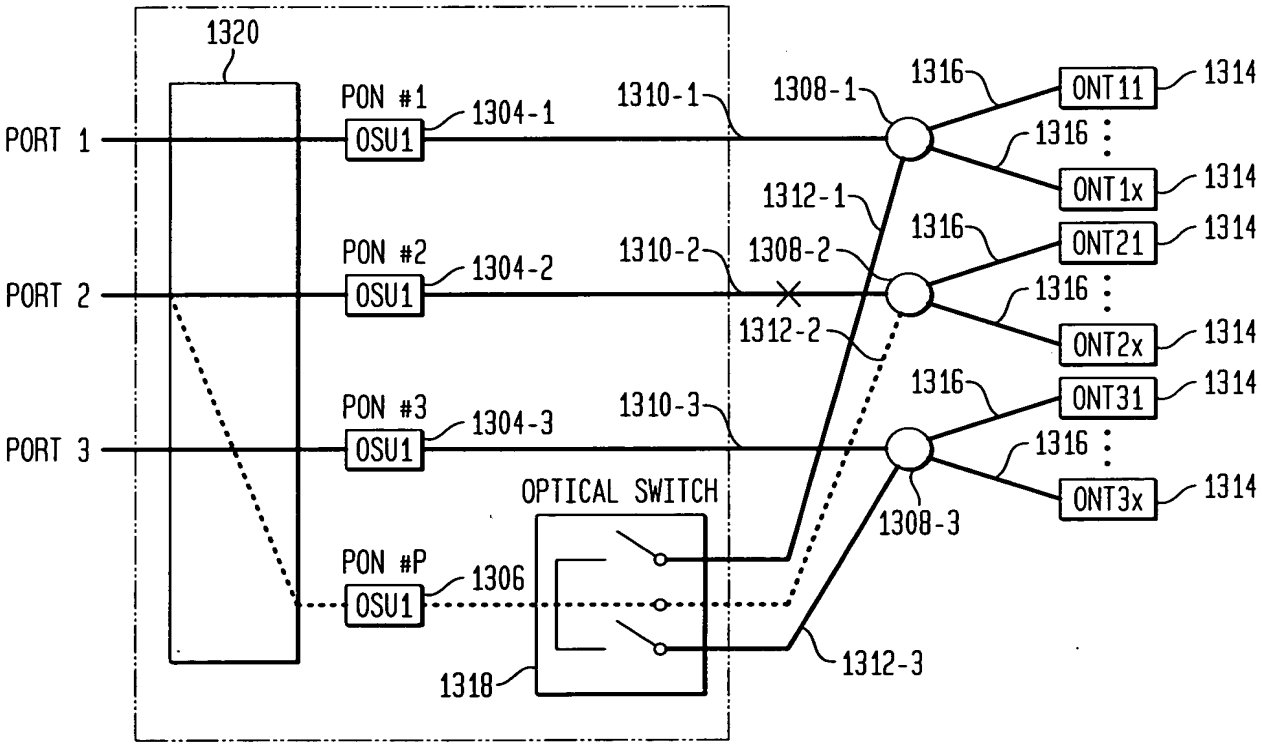
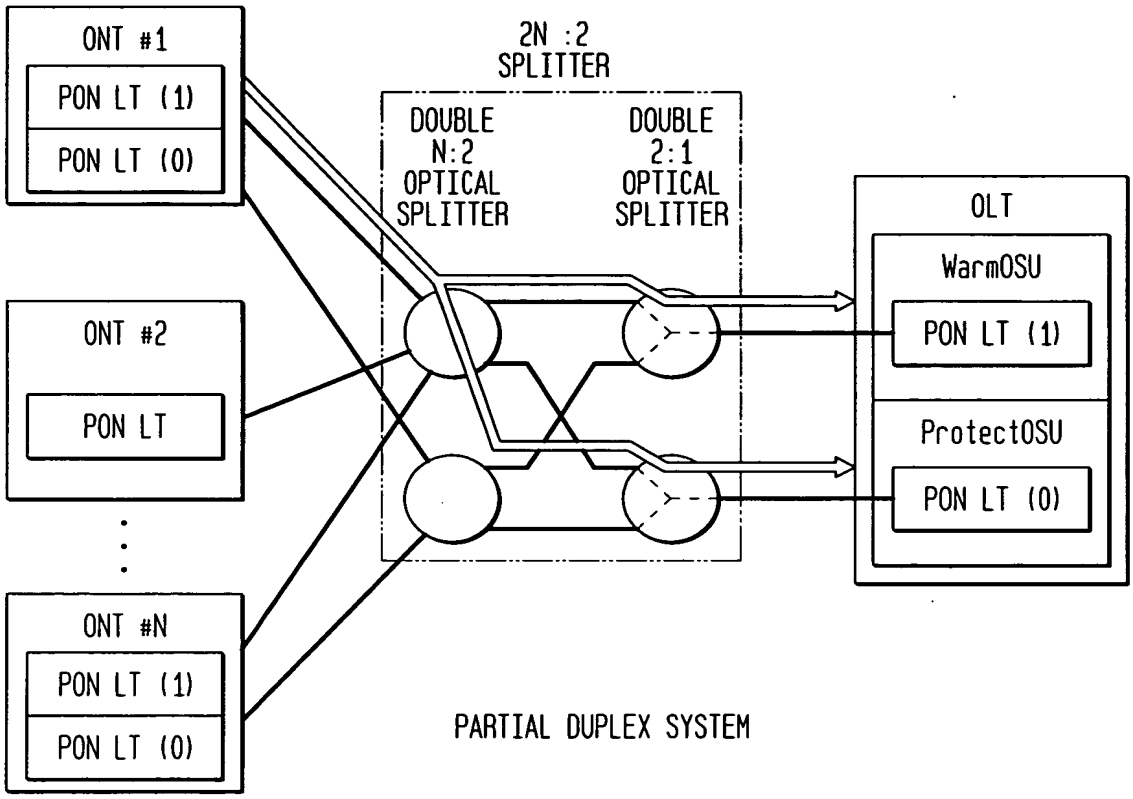
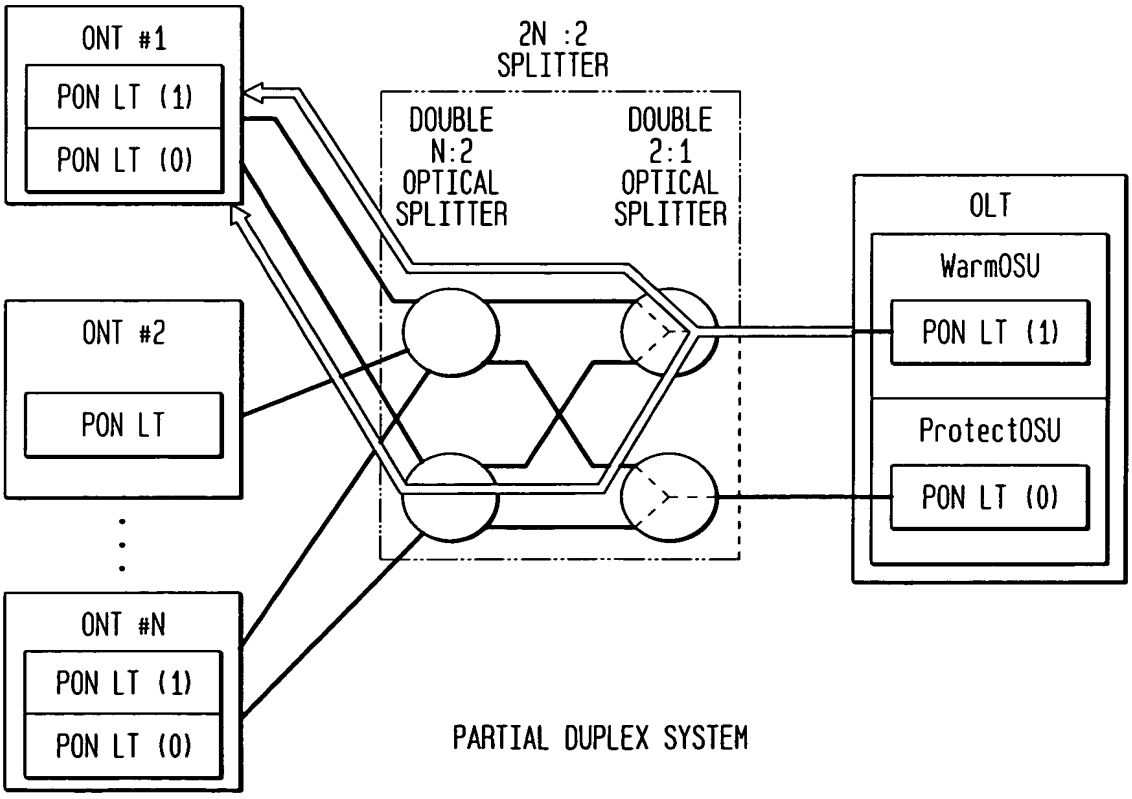


FIG. 13



PARTIAL DUPLEX SYSTEM

FIG. 14



PARTIAL DUPLEX SYSTEM